Employee involvement and empowerment in health and safety: A perception of small and medium contractors in South Africa

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Abstract

Purpose: It is well known that managing H&S helps ensure that construction organizations are achieving their H&S objectives and targets. As such, the H&S management practices constitute a vehicle to improve H&S performance outcome. However, the challenge is to determine what needs to be measured and practiced by SMEs at project level. The objectives of this paper are therefore to determine the H&S elements indicative of SMEs, employee involvement and empowerment H&S practices and the influence of employee involvement and empowerment on H&S performance at project level.

Research methodology: A survey was conducted using a structured questionnaire consisting of 31 items categorized in five independent variables (IV). This was developed from extensive literature and four rounds of Delphi survey. A total of 216 valid questionnaires were analysed using statistical package for social sciences (SPSS) version 20. Inferential statistics were used to determine the perception of SMEs employee involvement and empowerment practices. Finally, standard multiple linear regression analysis was undertaken to establish the influence employee involvement and empowerment had on H&S performance.

Findings: Five IVs were retained as valid and reliable factors of H&S practice within SMEs at project level. However the study established that employee involvement and empowerment is not greatly practiced and does not influence H&S performance.

Limitations: Self-administered questionnaire for SMEs and the majority of the respondents conducting business in Gauteng province in South Africa are limitations in this study.

Value: The findings indicate the need to fully involve and empower employees in H&S activities of SMEs at project level.

Practical implication: This study provides the basis of informing the H&S policy that employee involvement and empowerment is not greatly practiced within construction SMEs in South Africa at project level. Hence, the need to encourage this practice within South African SMEs is highly recommended.

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1. Introduction

In South Africa the construction industry accounted for a total of 74 deaths recorded on site in 2003 and was ranked third after mining and transport. Records of the Compensation Commissioner and Federated Employers Mutual Assurance Company Ltd (FEMA) reported approximately 25,500 accidents per annum (Construction Industry Development Board (CIDB, 2004). The current construction H&S statistics available provided by the Department of Labour (DoL) covering the period 2004/05 to 2007/08, reveal a sharp rise in fatalities and non-fatal accidents as indicated in Table 1.

Table 1: Construction health and safety statistics

Accident/Year	2004/04	2005/06	2006/07	2007/08
Fatal	54	81	79	162
Non-fatal	159	250	245	396
Total	213	331	324	558

Source: Adapted from CIDB 2008 report

Furthermore, as per the year 2007 the direct cost of claims finalized according to FEMA amounted to about ZAR116million, implying indirect cost of around ZAR1.65 billion. Similarly figures from the compensation commission can be estimated to about ZAR3.5 billion per year or around 2% of the construction spent, to cater for direct and indirect cost of accidents (CIDB, 2008). It is worth noting that the aforementioned statistics are inclusive of large, medium and small contractors. Aside from the direct compensation and medical costs associated with accidents the costs to the economy are immense and include rework, lost time, damage to plant and equipment, disruption, productivity loss, legal fees and loss of skills to the industry.

1.1 Current challenges encountered by SMEs in managing H&S in the South Africa construction industry

South African SMEs in construction have been described as being largely underdeveloped (Department of Public Works (DPW), 1999), and face several challenges that include the lack of H&S training and competence (CIDB, 2008). They generally lack knowledge of pricing procedures, contractual rights and obligations, law, management techniques and principles as well as technology (Martin, 2010). Furthermore, given their limited resources and capacity, they would typically have poorer H&S practices and culture. They are also less likely to have an established H&S management system, furthermore, the management of H&S is mostly less structured and based on prior contract experience of the owners (CIDB, 2008). It is likely that these contractors would not be aware of the demands and requirements of the South African generic and construction H&S legislative framework and requirements. Furthermore, employee involvement and empowerment in H&S would be minimal.

1.2 Health and safety performance measures

The establishment of a good H&S culture within SMEs can undoubtedly help organizations to control and reduce their construction costs and increase the efficiency of their operations in the long term (Ferreira et al., 2011). Since poor H&S culture can lead to risks to human lives, much attention has been paid over the past few years, to organizational H&S culture, especially to its characteristics that is definitions, core elements or leading indicators and its leading indicator metrics. This is because there is no consensus of the definition of H&S culture, as different authors define H&S culture to suit their situation (Choudhry et al., 2007). Furthermore, there is no consensus of the measures or indicators to effectively monitor H&S culture (Fernandez-Muniz et al., 2007).

Unfortunately, several measures for H&S performance measurement are used. The most common of these measures is accident rates and fatal injuries (Hinze, 2005). These are lagging indicators or downstream indicators, which are inherently flawed (Trethewy, 2003) and unsuccessful in providing meaningful measures of H&S performance (Hinze 2005), they are not concerned of how to improve H&S performance, but rather they are concerned with negative H&S performances or failure of the H&S system (Cohen, 2002). Furthermore, the possibility of under-reporting of accidents (Dindsdag et al., 2008) especially in countries where the reporting system is poor is high (CIDB, 2008) hence not reflecting a true outcome of H&S performance. Mohammed (2003) further indicated that using accident statistics can encourage under-reporting as workers may fear being reprimanded for compromising the safety performance of the workplace. Despite the limitations of using outcome H&S metrics, they can provide valuable information, especially when used in combination with well selected current leading indicators (Blair et al., 2010).

To overcome the limitations of using lagging indicators, Trethewy (2003) suggest that features of upstream, leading indicators or proactive indicators of H&S culture that have the greatest downstream consequences namely reduction of accidents, absenteeism, but to name a few need to be identified. This was further supported by Hinze (2005). Graborwski et al., (2010), further states that using leading indicators of H&S culture gives early warning before the incident or accident takes place.

Dingsdag et al., (2008) maintains that there are still no standard national and international leading indicators for measuring H&S culture or H&S performance that are accepted by the construction industry or any other industry. Hinze (2005) indicated the need to develop a range of leading indicators that are relevant to the construction organizations requirements. This statement is supported by, Blair et al., (2010), who assert that what works for one industry or size of organization may not work for another industry or size of organization.

2. Literature review

Ng et al., (2005) developed a framework to evaluate H&S performance at project level and organization level. Their study identified 13 sub-factors for organization level and 18 for

project level. The main project related elements were; project management commitment, hazard management, information, training and promotion of H&S, implementation of H&S system of work, H&S inspection, recording, reporting and investigation of accidents, emergency procedures of H&S and H&S review. The organization related elements were; administrative and management commitment, H&S training, selection and control of subcontractors, H&S review, accidents records and compliance with legislation, codes and standards. This model did not reflect whether the factors or sub-factors had an influence to improve H&S performance, but rather there importance to improve H&S performance. This is a limitation of this framework and further research is required to validate this model.

Teo and Ling (2006) developed a model to measure the effectiveness of construction site H&S management. The model was based on 3P + I, where "3P" represented policy factors, process factors, and personnel factors and "I" represented incentive factors. These core factors were measured in terms of 17 sub-factors. The model comprised of a hierarchical framework with different levels of measurement where level 1 represented the main factors, level 2 represented the attributes required to measure level 1.

Chinda and Mohamed (2008) developed H&S culture model adapted from the European Foundation Quality Model (EFQM), they identified several enablers, namely; leadership, policy and strategy, partnerships and resources, processes, and H&S outcomes such as goals. The study examined the interrelationships of the elements and their impact on the H&S outcomes. The enablers were measured using 34 indicators. The "best fit" model that was attained included a final set of 24 indicators with leadership commitment as the key driver of H&S culture. This enabled performance improvement in the form of reduced numbers of accidents, improved industrial image, improved workforce morale and reduced accidents cost.

Fernandez-Muniz et al., (2007) developed a positive H&S culture model that included management commitment, employee involvement and safety management system (SMS). The SMS was composed of; H&S policy, incentives, training, communication, planning and control. The study found that H&S improved when managers and employees were involved in H&S activities and the effective implementation of SMS. The conceptual model constituted of 57 items including four outcome measures or lagging indicators. The model finally consisted of 29 items that could arguably reduce the number of personal injuries and damage of materials. Motivate employees to work and reduce absenteeism which would lead to reduced lost time at work. This model was developed to fit different industries and different sizes of organization. The challenge is that different industries and different sizes of organizations differ in their working environment and characteristics, and no measure will work effectively for all industries or even all sites within the same location (Blair *et al.,* 2010), whose sentiment was supported by Maloney, (2011).

3. Problem statement

Based on the aforementioned gaps and developments in measuring H&S performance coupled with SMEs H&S challenges and their importance to the economy. This research proposes to answer the following specific research questions.

- What are the H&S elements that are indicative of SMEs at project level?

- What is the perception of SMEs on employee involvement and empowerment practices? and

- Do employee involvement and empowerment in H&S influence H&S performance at project level of SMEs?

4. Research methodology

A mixed method design was used for this study. The questionnaire was developed from relevant literature and four rounds of Delphi survey with 20 H&S experts of, which 16 H&S experts completed all the four rounds of Delphi. The developed SME questionnaire was administered to upper management personnel to establish their H&S practice at their project level. The survey consisted of 31 statements/items/leading indicator metrics addressing five H&S elements rated using five point Likert-scales indicating their level of agreement.

Other parts of the questionnaire were designed to profile the participants in terms of their; gender, position in the company, level of experience in the construction industry and the number of years in the current organization. Following the questionnaire pre-testing with eight upper management personnel or those who were knowledgeable of H&S practices in their organizations, the final refined version of the SMEs questionnaire was presented to 1450 conveniently sampled SMEs using email and drop and collect methods. 228 questionnaires were returned and 216 were deemed eligible for analysis. The statistical package for social sciences (SPSS) version 20 was used to analyze the factor structure of the H&S practices, extracted using maximum likelihood and PROMAX rotation. The perception of the respondents was reported using inferential statistics i.e. means and standard deviation. Finally, the influence of employee involvement and empowerment in H&S on H&S performance was determined using standard multiple linear regression analysis.

5. Results and discussions

5.1 The health and safety elements indicative for SMEs

The reliability and the validity of the proposed elements obtained from literature review and Delphi survey are analysed and the results of each H&S element are tabulated below:

Upper Management Involvement and Commitment in H&S

The result in Table 2 indicates that the corrected item-total correlation were greater than the suggested cut-off value of 0.30 (Nanually et al., 1994) suggesting that the items are good measures of the element and the Cronbach alpha is greater than 0.70 (Nanually et al., 1994) indicating internal reliability. The Kaiser-Meyer-Olkin (KMO) of 0.890 with Bartlett's Test of Sphericity of $p<0.000$ were also obtained. Indicating consistency with the recommended

KMO cut-off value of 0.60 and Bartlett's Test of Sphericity of p<0.05 suggested by Hair et al., (2010). This result suggests that factor analysis can be conducted with the data.

All nine items expected to measure upper management commitment and involvement loaded together on this factor. An Eigenvalue of 5.107 and factor loadings greater than 0.452 for all of the items were established and are reported in Table 2. The factor loadings were greater than the cut-off value of 0.40 recommended by Hair et al., (2006). The factor upper management commitment and involvement explains 46.427% of the variance in the data. Therefore, sufficient evidence of discriminant validity is provided for this construct. This result concurs with Fernandez-Muniz et al., (2007). The item that loaded highly on this element was "I/We communicate regularly with workers about H&S".

Table 2: Upper management commitment and involvement in H&S

Eigen value 5.107 % of variance 46.427		Cronbach-alpha 0.868 KMO 0.890 p<0.000		
Item	Question	Factor loading	Corrected Item total correlation	Cronbach level after deletion
UMC 3	I/We communicate regularly with workers about H&S	0.786	0.718	0.847
UMC 4	I/We actively monitor the H&S performance of the projects and workers.	0.778	0.737	0.844
UMC 8	I/We encourage discussions on H&S with employees	0.728	0.689	0.849
UMC 7	I/We regularly visit workplaces to check work conditions or communicate with workers about H&S	0.717	0.663	0.850
UMC 6	I/We actively and visibly lead in H&S matters by e.g. walk through the site etc.	0.672	0.600	0.855
UMC 5	I/We take responsibility for H&S by e.g. stopping dangerous work on site etc.	0.667	0.598	0.854
UMC 10	I/We ensure that the H&S equipment is bought e.g. hardhats, overall etc.	0.618	0.566	0.857
UMC 9	I/We conduct toolbox talks with the workers regularly	0.604	0.555	0.857
UMC 2	I/We accord workers H&S training when there is less work in the project.	0.491	0.476	0.865
UMC 11	I/We reward workers who make extra effort to do work in a safe manner.	0.465	0.432	0.873
UMC 1	I/We encourage and support worker participation, commitment and involvement in H&S activities.	0.452	0.415	0.867

Worker involvement and empowerment in H&S

The result in Table 3 indicates that the corrected item-total correlation were greater than the suggested cut-off value of 0.30 (Nanually et al., 1994) suggesting that the items are good measures of the element and the Cronbach alpha is greater than 0.70 (Nanually et al., 1994) indicating internal reliability. The Kaiser-Meyer-Olkin (KMO) of 0.819 with Bartlett's Test of Sphericity of p<0.000 were also obtained. Indicating consistency with the recommended KMO cut off-value of 0.60 and Bartlett's Test of Sphericity of p<0.05 suggested by Hair et al., (2010). This result suggests that factor analysis can be conducted with the data.

All five items in Table 3 expected to measure the factor employee involvement and empowerment loaded together on this factor. An Eigenvalue of 3.079 and factor loadings attained were greater than 0.458 for all the items and concurs with the cut-off value of 0.40 recommended by Hair et al., (2006). The employee involvement and empowerment explains 61.557% of the variance in the data. Therefore, sufficient evidence of discriminant validity is provided for this construct. This result concurs with Fernandez-Muniz et al., (2007). The item that loaded highly on this element was "Our workers are involved in the production of H&S policy".

Table 3: Worker involvement and empowerment in H&S

Eigen value 3.079 % of variance 61.577		Cronbach-alpha 0.842 KMO 0.819 p<0.000		
Item	Question	Factor loading	Corrected item total correlation	Cronbach level after deletion
WIS 4	Our workers are involved in the production of H&S policy	0.863	0.757	0.778
WIS 2	Our workers help in developing of H&S rules and safe work procedures	0.839	0.770	0.776
WIS 5	Our workers are consulted when the H&S plan is compiled	0.814	0.714	0.791
WIS 1	Our workers are involved in H&S inspections.	0.598	0.563	0.832
WIS 3	Our workers can refuse to work in potentially unsafe, unhealthy conditions	0.458	0.444	0.857

Occupational Health and Safety Management System

Three factors of occupational health and safety management system were validated, namely; project H&S planning and communication, project supervision and H&S resources and training. The results are reported below;

Project H&S planning & communication

The result in Table 4 indicates that the corrected item-total correlation were greater than the suggested cut-off value of 0.30 (Nanually et al., 1994) suggesting that the items are good measures of the element and the Cronbach alpha is greater than 0.70 (Nanually et al., 1994) indicating internal reliability. The Kaiser-Meyer-Olkin (KMO) of 0.764 with Bartlett's Test of Sphericity of $p<0.000$ were also obtained. Indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of $p<0.05$ suggested by Hair et al., (2010). This result suggests that factor analysis can be conducted with the data.

All four items in Table 4 expected to measure the factor project H&S planning and communication loaded together on this factor. An Eigenvalue of 2.786 and the factor loadings attained were greater than 0.665 for all the items and concurs with the cut-off value of 0.40 recommended by Hair et al., (2006). The project H&S planning and communication explains' 69.644% of the variance in the data. Therefore, sufficient evidence of discriminant validity is provided for this construct. This result concurs with Fernandez-Muniz et al., (2007).

The item that loaded highly on this element was “Our firm uses procedures to identify possible H&S dangers on site”.

Table 4: Factor project H&S planning and communication

Eigen value 2.786 % of variance 69.644		Cronbach-alpha 0.852 KMO 0.764 p<0.000		
Item	Question	Factor loading	Corrected item total correlation	Cronbach level after deletion
PPC 2	Our firm uses procedures to identify possible H&S dangers on site	0.833	0.749	0.788
PPC 3	I/We include H&S in our projects program	0.822	0.763	0.784
PPC 1	I/We consider H&S when layout of site is done	0.769	0.671	0.823
PPC 4	I/We organize regular meetings to verbally inform workers about the risks and preventive measures of their work.	0.665	0.598	0.850

Project supervision

The result in Table 5 indicates that the corrected item-total correlation for each item were greater than the suggested cut-off value of 0.30 (Nanually et al., 1994) suggesting that the items are good measures of the element, whereas Cronbach alpha is greater than 0.70 (Nanually et al., 1994) indicating internal reliability of the element. The Kaiser-Meyer-Olkin (KMO) of 0.868 with Bartlett’s Test of Sphericity of p<0.000 were also obtained. Indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of p<0.05 suggested by Hair, et al., (2010). This result suggests that factor analysis can be conducted with the data.

Table 5: Factor project supervision

Eigen value 3.640 % of variance 60.662		Cronbach-alpha 0.868 KMO 0.868 p<0.000		
Item	Question	Factor loading	Corrected item total correlation	Cronbach level after deletion
PSP 1	I/we allow supervision of work by staff trained in H&S.	0.786	0.722	0.837
PSP 5	I/we undertake informal H&S inspection of the work place daily.	0.781	0.719	0.837
PSP 2	One of our employees trained in H&S identifies dangerous activities.	0.718	0.658	0.848
PSP 3	I/we undertake formal H&S inspection of the work place daily.	0.714	0.644	0.850
PSP 4	I/We allow local authorities and H&S enforcement agencies to visit sites for inspection.	0.693	0.645	0.850
PSP 6	I/we regularly undertake H&S audits of projects	0.666	0.620	0.854

Table 5 results further indicate that all six items expected to measure the factor project supervision loaded together on this factor. An Eigenvalue of 3.640 and the factor loadings

attained were greater than 0.666 for all the items and concurs with the cut-off value of 0.40 recommended by Hair et al., (2006). The project supervision explains 60.662% of the variance in the data. Therefore, sufficient evidence of discriminant validity is provided for this construct. This result concurs with Fernandez-Muniz et al., (2007). The item that loaded highly on this element was "I/we allow supervision of work by staff trained in H&S".

Health and safety resources and training

The result in Table 6 indicates that each corrected item-total correlation were greater than the suggested cut-off value of 0.30 (Nanually et al., 1994) indicating that the items correlate well in the element and the Cronbach alpha is greater than 0.70 (Nanually et al., 1994) indicating internal reliability. The Kaiser-Meyer-Olkin (KMO) of 0.801 with Bartlett's Test of Sphericity of $p<0.000$ were also obtained. Indicating consistency with the recommended KMO cut-off value of 0.60 and Bartlett's Test of Sphericity of $p<0.05$ suggested by Hair, et al., (2010). This result suggests that factor analysis can be conducted with the data.

Table 6: Factor H&S resources and training

Eigen value 3.281 % of variance 65.628		Cronbach-alpha 0.864 KMO 0.801 p<0.000		
Item	Question	Factor loading	Corrected item total correlation	Cronbach level after deletion
HSR 2	I/we provide correct tools, equipment to execute construction work.	0.783	0.724	0.832
HSR 5	I/we ensure that workers are trained to do the work safely	0.771	0.706	0.830
HSR 4	I/We ensure our workers are properly trained to take care and use personal protective equipment	0.763	0.691	0.834
HSR 3	I/we conduct induction of all workers on H&S before commencing work on a particular site	0.751	0.698	0.835
HSR 1	I/We buy hardhats, gloves, overall etc. for workers	0.708	0.639	0.847

All five items in Table 6 expected to measure H&S resources and training loaded together on this factor. An Eigenvalue of 3.281 and the factor loadings attained were greater than 0.708 for all the items and concurs with the cut-off value of 0.40 recommended by Hair et al., (2006). The factor H&S resources and training explains 65.628% of the variance in the data. Therefore, sufficient evidence of discriminant validity is provided for this construct. This result concurs with Choudhry et al., (2007). The item that loaded highly on this element was "I/we provide correct tools, equipment to execute construction work".

5.2 Perception of SMEs on employee involvement and empowerment H&S practices

Furthermore, the result in Table 7 indicates that two of the five practices were considered to be highly practiced by the SMEs. These highly ranked practices were; "workers can refuse to work in potentially unsafe, unhealthy conditions" and "workers are involved in H&S

inspections" with mean values of 4.26 and 4.02 respectively. They were also reliable measures of employee involvement and empowerment in H&S. The reliability values were above the recommended value of 0.70 recommended by Hair et al., (2006). However, the least H&S practice was "workers are involved in the production of H&S policy" with a mean value of 3.64.

Table 7: Employee involvement and empowerment in H&S

Item	Action	Mean	Standard deviation	Cronbach level after deletion	Rank
WIS 3	Our workers can refuse to work in potentially unsafe, unhealthy conditions.	4.26	0.788	0.857	1
WIS 1	Our workers are involved in H&S inspections.	4.04	0.884	0.832	2
WIS 2	Our workers help in developing of H&S rules and safe work procedures.	3.87	0.931	0.776	3
WIS 5	Our workers are consulted when the H&S plan is compiled	3.68	1.047	0.791	4
WIS 4	Our workers are involved in the production of H&S policy	3.64	1.006	0.778	5

5.3 Influence of employee involvement and empowerment on H&S performance

The result in Table 8 indicates that employee involvement and empowerment was the least practiced of the five H&S practices with a mean value of 3.90. Furthermore, employee and empowerment in H&S does not influence H&S performance as the t-value was less than ±1.96 at 1.28 and was non-significant at 0.20, which was greater than 0.05. This is contrary to the findings of Fernandez-Muniz et al., (2007). However, H&S resources and training, upper management commitment & involvement in H&S and project supervision influenced H&S performance. Hence, they were significant.

Table 8: H&S practices influence on H&S performance

H&S practice	Mean	Std. Deviation	N	t-value	Sign. (*p*)	Rank
H&S resources and training	4.51	0.56	212	3.03	0.00	1
Upper management commitment & involvement in H&S	4.33	0.48	193	3.06	0.00	2
Project H&S planning and communication	4.19	0.66	207	-0.22	0.83	3
Project supervision	4.14	0.64	204	3.06	0.00	4
Employee involvement & empowerment in H&S	3.90	0.73	208	1.28	0.20	5

6. Conclusions and recommendations

The results of this study are encouraging and suggest that the H&S elements are valid and reliable practices within construction SMEs. The results therefore concur with the study of Fernandez-Muniz et al., (2007) and it can be indicated that H&S culture within SMEs in South Africa comprises of, upper management commitment and involvement in H&S, employee involvement and empowerment in H&S, project H&S planning and communication, project supervision and H&S resources and training. The five H&S practices

measuring employee involvement and empowerment were practiced with different intensity. SMEs agreed that their workers can refuse to work in potentially unsafe, unhealthy conditions and their workers are involved in H&S inspections. However, the SMEs indicated that their workers involvement in the production of H&S policy was not comprehensively practiced. The perception of SMEs on employee involvement and empowerment in H&S was the least practiced of the five elements of H&S. Furthermore, it did not influence H&S performance.

Further research is advocated. This is to determine the reason why employee involvement and empowerment did not influence H&S performance. Furthermore, the use of structural equation modelling in developing H&S performance improvement model for SMEs at project level is suggested for further study. This will enable to compare the multiple linear regression analysis and structural equation modelling results.

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